We should very much like to go further into an analysis of the interesting observations on the loess, scattered through M. Moushketoff's "Turkestan"; but can only mention that the loess which is widely spread over the region, both on the outskirts of the Tian-Shan and in the neighbouring lowlands, is always accompanied by what the author describes as a "conglomerate," and which is most probably some kind of more or less modified glacial deposit. Both are inseparable, and the loess invariably covers the "conglomerate" when they are met together. Of course, the loess extends further in the lowlands, and the "conglomerate" in the hilly tracts. Sometimes there are layers of loess amidst the "conglomerate." As to the loess itself, although mostly quite typical, it sometimes appears stratified to a certain extent; but it does not differ at all from the unstratified loess. M. Moushketoff accepts Richthofen's theory as to the eolic origin of loess; but he does not deny that water spreading over a wide surface at the issue of small depressions of the ground, gives the same typical loess as that which may be considered eolic in its origin.

We ought to notice also a special question discussed at length by M. Moushketoff, namely, his thorough researches, made in company with Prof. Beck, on the nephrite (jade) of which the stone on the grave of Timur at Samarkand is made, as to its chemical composition, micro-structure (represented on a coloured plate), and also the different places where nephrite is found throughout the world. But we must merely commend these interesting researches to the attention of mineralogists.

As may be seen from the foregoing notice, the work of M. Moushketoff is an acquisition of the first importance for all those interested in the geography and geology of Turkestan. The chapters containing the descriptive part of the work will be, for a long time to come, an especially valuable source of varied and reliable information.

P. K.

CHEMISTRY FOR THE GOLD-FIELDS

Chemistry for the Gold-Fields: including Lectures on the Non-Metallic Elements, Metallurgy, and the Testing and Assaying of Metals, Metallic Ores, and other Minerals, by the Test-tube, the Blow-pipe, and the Crucible. By James G. Black, M.A., D.Sc., Professor of Chemistry, Metallurgy, and Assaying in the University of Otago, and Otago School of Mines. 8vo, pp. 569. (Dunedin, 1885.)

THE title "Chemistry for the Gold-Fields" the author justifies by stating in his preface that in writing this book he had three objects in view:—

"First.—To put into the hands of miners and prospectors a guide to enable them to identify, by simple tests and cheap appliances, the valuable ores when they find them.

"Second.—To provide a manual in chemistry, metallurgy, analysis, and assaying for the 'Schools of Mines' which are now being established on the gold-fields of the colony.

"Third.—To provide for his own students in the chemistry, metallurgy, and assaying classes in the University of Otago, a text-book in these subjects introductory to the larger treatises"

The book includes an elementary treatise on the chemistry of the various elements, and on this portion of the book it is scarcely necessary to dwell, as it is claimed that "the feature of the book" is to deal with "such subjects as have a direct reference to the mineral resources" of New Zealand, and "the extraction of the metals from their ores." We propose, therefore, to confine our remarks to that portion of the work which relates more especially to the detection of minerals, the methods for assaying them, and their metallurgical treatment. The ores of each metal are described, their chief physical characteristics being stated, as well as the ordinary blow-pipe tests, and this latter portion of the subject is made more useful by an appendix on the use of the blow-pipe by A. Montgomery, M.A., the brevity of which is greatly to be regretted.

To the metallurgy of zinc the author devotes little more than three pages, nearly half of which is devoted to the abandoned English crucible process. The Belgian process is briefly described, and in half-a-dozen lines the Silesian process is touched upon. With regard to this latter description the author remarks that "various modifications of this process have now, it is said, been adopted in many of the larger smelting works." This remark could with justice have been appended to many of the descriptions of other processes given by the author. In the metallurgy of lead the use of iron for the decomposition of the silicate is not mentioned, and the description of lead-refining is very incomplete, as also is that of the process for the de-silverisation of lead by the aid of zinc; the use of steam for the de-zincification of the lead is not given. In the description of the Welsh process of copper smelting the coarse metal slag is stated to be a ferric silicate—ferric silicates are, as such, rarely, if ever, produced in metallurgical processes. In describing the refining of copper the author gives equations to show that the reduction of the cuprous oxide on poling is due to the products of the dry distillation of the green wood employed; the action of the anthracite spread over the molten metal is not referred to. The electrolytic refining of copper is not mentioned, and electrolytic processes generally, which would be so important in a country like New Zealand, are ignored.

In describing the Ziervogel process the author remarks, p. 344: "When copper pyrites containing silver is roasted, under certain conditions, the iron and copper may be converted into insoluble oxides, while the silver is converted into sulphate of silver which dissolves in water. The presence of mercury promotes this reaction." This at least suggests that mercury should be charged into the roasting furnace. Again, p. 348, Ziervogel's "process is now carried on on a large scale at Freiberg, in Saxony," the fact being that it has long been abandoned there, except as a very minor incident of a portion of the process. The process of pan-amalgamation, as described by the author, is inaccurate. In describing the methods employed for the production of steel, the Siemens "ore and pig" process is not mentioned, and the basic Bessemer process is only referred to by the sentence: "By a recent invention, however, whereby the converter is partly lined with lime, it is said that sulphur and phosphorus are also removed in the Bessemer process."

The author suggests "a rapid process for distinguishing galena from zinc blende, grey antimony ore, and the other mineral sulphides for which it is sometimes mis-

taken," which involves solution, evaporation, &c., for lead sulphate, filtration, and submitting the solution to ordinary chemical tests. This is surely not a method adapted to the use of "miners and prospectors."

With regard to assaying, in the case of copper ores not one of the ordinary methods of assay is given, and the ordinary method for assaying silver ores finds a place in an addendum to the volume. The whole book affords additional evidence of the prevalence of the belief in the fallacy that a chemist must of necessity be acquainted with a subject so dependent on his own, yet so widely differing from it, as metallurgy.

OUR BOOK SHELF

Microbes, Ferments, and Moulds. By E. L. Trouessart. "International Scientific Series." (London: Kegan Paul, Trench, and Co., 1886.)

THIS book, which aims at the instruction in microbes not so much of the medical and scientific as of the general public, is a fairly accurate exposition of the present state of our knowledge of the morphological and physiological characters of moulds and bacteria.

The chapters on fungi and moulds, of the various ferments and yeasts, and their chemistry, are the best parts of the book. Those on bacteria, septic and pathogenic, are less commendable, since they contain a good many dogmatic statements not accepted by bacteriologists. The chapter on laboratory research and culture of microbes is imperfect in its account of the now generally employed methods of cultivation on solid nutritive media.

One of the most conspicuous deficiencies of the book in the eyes of the scientific reader is the one-sided account given by the author of many of the discoveries made in bacteriology, since the works of French authors form as it were the basis of the author's account. It is certainly a novel proposition that "the science of microbes is essentially a French science."

The book is well illustrated, and written in a clear and concise manner.

LETTERS TO THE EDITOR

[*The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts. No notice is taken of anonymous communications.*

[*The Editor urgently requests correspondents to keep their letters as short as possible. The pressure on his space is so great that it is impossible otherwise to insure the appearance even of communications containing interesting and novel facts.*]

Luminous Clouds

THE clouds described by D. J. Rowan, on p. 192 in your issue of the 1st inst., seem to have been of the same kind as were described in several letters in NATURE last summer; they were seen by myself in Bavaria. I saw these extraordinary clouds again this year, on the 28th of May, at Freshwater Bay, Isle of Wight, and on the 23rd of June at Bideford. They were seen by A. C. Dixon at Sunderland on the 2nd, 3rd, 13th, 16th, 22nd, and 23rd of June, and on the latter date were very striking. A description of them on the same date, written by E. Greenhow, appeared in the *Newcastle Chronicle*, as seen near Earsdon in Northumberland, erroneously describing them as a kind of aurora. On that night the display at Bideford was comparatively slight: at 10.18 p.m. the upper limit of the clouds distinctly visible was five-eighths of the way from the horizon to γ Andromedæ, and I presume that that was the limit to which the sun was shining upon them; though with field-glasses I could see them very faintly rather higher up.

I never saw them before last summer, and they are quite different from the iridescent clouds that have created such interest the last two winters, resembling them only in their height and brilliancy. If they require a name I hope the word *boreales*, as proposed by Mr. Rowan, will not be adopted; for they appear in the north only because the sun lies in that direction, and if they occurred at any other time of the year, or in any place much further south than this country, their direction would necessarily be different. On all the occasions which I have seen these clouds they have exhibited a very fine structure like cirrus. The colours of the clouds appear to be due to the same cause as the colours of the sky, for they generally correspond with these at similar altitudes, the upper visible portion of the sheet of clouds being green or bluish, and the lower portion a dull yellow, becoming more orange towards the horizon.

Sunderland, July 8 T. W. BACKHOUSE

Re Immisch's Thermometer

IN your article, p. 234, referring to this pretty little instrument, you refer to the appellation "metallic" as not a happy one in describing it. This I pointed out to the maker some time ago, and termed it an *avitreous* thermometer, as glass plays no part in its construction beyond that of a protector to the dial. The certificates of verification are printed with the instrument so designated, and probably the erroneous term will soon drop out of use. I must also crave permission to correct a misprint in your correspondent's statement with regard to the number of avitreous thermometers verified here up to the present date: for 500 read 300. G. M. WHIPPLE,

Superintendent Kew Observatory

Kew Observatory, July 10

Kirby and Spence's "Introduction to Entomology"

WITH reference to a just complaint made by "R. M." in his article contained in NATURE for July 1 (p. 190) about the want of good indexes to books, and specially to the early editions of Kirby and Spence's "Introduction to Entomology," may I venture to inform him that should an index to the latter book be desired by "R. M." or any other reader of NATURE, they have only to apply to "E. E. J.," Camerton Court, Bath, to obtain one *gratis*. I found the book so perfectly useless for want of one, that I made one some years ago, a copy of which was accepted by the British Museum authorities, and is now included in their Catalogue. I have a good many copies on hand, which I am always glad to give away on application.

E. E. JARRETT

11, Holles Street, London, W., July 8

ON VARIATIONS OF THE CLIMATE IN THE COURSE OF TIME[1]

II.

IF such a periodical variation in the climate does take place, we should be able to trace it in the older formations, as we cannot assume that it first began to operate in the most recent geological age. We must, therefore, try to discover if such variation can be traced in the earlier times.

During the melting of the Norwegian inland ice it left here and there moraines, and on the map drawn by Kjerulf they are seen to stretch in lines more or less continuously across large parts of Southern Norway. On both sides of the Christiania fjord the outside lines, the so-called "Raer," stretch like gigantic ramparts from Moss and Horten south-east and south-west many miles wide through Smaalenene and far into Sweden, and, on the other side of the fjord, through the province of Jarlsberg and Laurvig to Jomfruland outside Kragerö. And behind this outside line of moraines others follow in more or less broken but distinct continuity, one behind the other, through all Southern Norway. These lines show that the

[1] The following is a short abstract from various papers, viz.: "Essay on the Immigration of the Norwegian Flora during Alternating Rainy and Dry Periods" (Christiania, 1876). "Die Theorie der wechselnden kontinentalen und insularen Klimate," in Engler's *Botanische Jahrbücher*, ii. (Leipzig, 1881). "Ueber Wechsellagerung und deren mutmassliche Bedeutung für die Zeitrechnung der Geologie und für die Lehre von der Veränderung der Arten," in *Biologisches Centralblatt*, iii. (Erlangen, 1883). "Ueber die wahrscheinliche Ursache der periodischen Veränderungen in der Stärke der Meeresströmungen" *l.c.* iv. (Erlangen, 1884). Continued from p 225.